Claims (EP)

1. A method of transmitting at least one data packet (900) from a communication node in a data communication network, the method comprising the steps of:

receiving (920) a request at a communication node, to transmit said at least one data packet to a first destination address;

searching (930) for said (first) destination address in a cache of the communication node;

determining (940) an intermediary address of said destination address;

the method characterised by the steps of:

replacing (960) said destination address with said intermediary address to form a new destination address;

repeating said steps of searching, determining and replacing for said new destination address(es), until no new intermediary address is found; and

transmitting (970) said at least one data packet to said destination address via said intermediary address(es).

2. The method of transmitting at least one data packet (900) from a communication node in a data communication network according to Claim 1, wherein said data communication network supports nested network mobility operation and said step of transmitting includes the step of:

routing said at least one data packet via a plurality of routers in said nested mobility network.

3. The method of transmitting at least one data packet (900) from a communication node in a data communication network according to Claim 1 or Claim 2, wherein said data communication network operates in accordance with an IPv6 and/or IPv4 specification.

4. The method of transmitting at least one data packet (900) from a communication node in a data communication network according to Claim 1, wherein the intermediary address(es) comprise a care-of-address for a previous address in a nested network.

5. The method of transmitting at least one data packet (900) from a communication node in a data communication network according to Claim 1, wherein the communication node is a fixed corresponding node or a mobile node or the an intended recipient of the at least one data packet is a fixed node, for example a Local Fixed Node, or a Local Mobile Node or a Visiting Mobile Node.

6. The method of transmitting at least one data packet (900) from a communication node in a data communication network according to Claim 1, the method further characterised by the step of:

adding (950) a plurality of said destination address(es) and/or said intermediary address(es) to a routing header upon finding said destination address or intermediary address(es), thereby providing a desired route for delivering said at least one data packet to an intended recipient.

7. The method of transmitting at least one data packet (900) from a communication node in a data communication network according to Claim 6, wherein said step of adding includes adding a destination address of an intended recipient to said header; and

adding one or more subsequent address(es) as subsequent routers acknowledge their presence in a route of said data packet.

8. The method of transmitting at least one data packet (900) from a communication node in a data communication network according to Claim 1, the method further characterised by the step of:

adding (950) a plurality of IP headers containing said intermediary address(es) to said at least one data packet upon finding said intermediary address(es), thereby providing a desired route for delivering said at least one data packet to an intended recipient.

9. The method of transmitting at least one data packet (900) from a communication node in a data communication network according to Claim 1, wherein said step of adding includes determining an address of a final router to provide said intended recipient with said at least one data packet in order to complete a data route.

10. The method of transmitting at least one data packet (900) from a communication node in a data communication network according to any preceding Claim, the method further characterised by the steps of:

de-tunnelling a portion of said at least one data packet at a router having an intermediary address, in

order to determine an address of the communication node; and

transmitting said intermediary address to said communication node.

11. A method of generating a routing header (1100, 1150) for transmitting a number of data packets from a communication node to an intended recipient over a data communication network that supports nested network mobility operation, the method comprising the step of:

transmitting (970) a first data packet to a destination address of said intended recipient via a plurality of routers in said nested mobility network, each router identified by an intermediary address; the method characterised by the steps of:

de-tunnelling at least a portion of said at least one data packet at a number of routers, in order to determine an address of the communication node;

transmitting respective intermediary addresses from respective routers, operating in a data path of said first data packet, to said communication node; and

generating a routing header of a subsequent second data packet, at said communication node, for transmission of the second data packet to the intended recipient based on said respective intermediary addresses.

12. The method of generating a routing header according to Claim 11, wherein the steps of de-tunnelling and transmitting intermediary addresses are performed by substantially all of the mobile routers in the data path of said first data packet, thereby generating a substantially optimum route of the routing header for

subsequent data packets transmitted to said intended recipient.

13. The method of generating a routing header according to Claim 11, wherein the steps of de-tunnelling and transmitting intermediary addresses are performed upon successive transmissions of data packets to said intended recipient by a successive one respective router in the data path.

14. The method of generating a routing header according to Claim 11, the method further characterised by the step of:

storing each intermediary address in a data path to said intended recipient in a linked binding cache within the communication node, so that a substantially optimum data route via said addresses can be extracted from said linked binding cache in one pass for subsequently transmitted data packets.

15. A communication message having a routing header generated in accordance with Claim 11.

16. A communication message having a routing header (1100, 1150) and a data packet (1130), the routing header comprising:

an intended recipient address (1180) of the data packet;

the communication message characterised by:

a plurality of intermediary addresses (1115, 1120, 1160, 1170) corresponding to a respective plurality of

mobile routers to be used to forward said data packet to said intended recipient.

17. The communication message according to Claim 16, the communication message further characterised by the plurality of intermediary addresses (1115, 1160, 1170) being configured as respective IP headers where substantially each contains a sender address (1110) as a source address of the communication message and one of said plurality of intermediary addresses as a destination address (1160, 1170).

18. A communication unit, for example a Corresponding Node (655), having:

a memory element storing a linked binding cache; and

a processor, operably coupled to the memory element, for generating a routing process, based on information stored in the linked binding cache, for delivering a data packet to an intended recipient.

19. The communication unit (655) according to Claim 18, wherein linked binding cache includes pointers from one entry to the other when the care-of-address of an entry fits into the range defined for another's prefix.

20. A communication unit, for example a Corresponding Node (655), having: a processor operably coupled to a memory element storing a regular binding cache; wherein the communication unit is characterised by said processor employing a recursive approach of repeating said steps of searching, determining and replacing of new destination

address(es) in the binding cache, in accordance with Claim 1.

21. A method for building a linked binding cache (1000), the method comprising the step of:

storing a plurality of mobile router entries in a binding cache, wherein said plurality of mobile router entries include a first mobile router entry comprising a prefix and an indication of said prefix's length plus an associated intermediate address; and

linking a second mobile router entry to said first mobile router entry for delivering at least one data packet via said first mobile router;

the method characterised by the step of:

adding (1024, 1030) a pointer in said binding cache from the entry of said second mobile router to said first mobile router entry when the intermediate address of said second mobile router matches the first mobile router's prefix in order to create a linked binding cache.

22. The method for building a linked binding cache according to Claim 21, the method further characterised by the step of:

receiving a binding update message from a number of mobile routers to indicate their respective intermediate address in delivering at least one data packet to an intended recipient.

23. The method for building a linked binding cache according to any of preceding Claims 21 or Claim 22, the method further characterised by the steps of:

receiving at least one tunnelled data packet at a third mobile router;

de-tunnelling at least a portion of said at least one tunnelled data packet, by said third mobile router; and

sending a binding update message to a communication unit indicating said third mobile router as an intermediate router for passing on a data packet to said intended recipient to enable a pointer to be added in said linked binding cache from entry of said third mobile router to a second mobile router address.

24. The method for building a linked binding cache according to Claim 21, wherein the step of receiving, de-tunnelling and sending are performed by substantially each mobile router in a data path to the intended recipient, so that a linked binding cache for a data path route can be generated in a single step.

25. The method for building a linked binding cache according to Claim 21, the method further characterised by the step of:

comparing an intermediate address of said second mobile router to a prefix address of substantially each mobile router in said binding cache to determine whether a pointer should be added.

26. The method for building a linked binding cache according to Claim 25, the method further characterised by the step of:

comparing, when a match in said comparison step is found, substantially all other intermediate addresses to

a prefix address of said second mobile router, to determine whether a pointer should be added to said second mobile router address; and

repeating the comparison step process until no further match for an intermediate address is determined, thereby generating a preferred route to send at least one data packet to said recipient.

27. A storage medium (665) storing processor-implementable instructions for controlling a processor to carry out the method according to any of Claims 1 to 10 or any of Claims 11 to 14 or any of Claims 21 to 26.

28. An apparatus adapted to perform the method according to any of Claims 1 to 10 or any of Claims 11 to 14 or any of Claims 21 to 26.

29. A communication unit comprising apparatus according to Claim 28.

30. A communication system comprising a communication unit according to Claim 29 or apparatus according to Claim 28.